Sec. 6.6 Function Operations

Add. $(f+g)(x) = f(x) + g(x)$

Sub. $(f-g)(x) = f(x) - g(x)$ distribute!

Mult. $(f \cdot g)(x) = f(x) \cdot g(x)$

Div. $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \ g(x) \neq 0$

Domain:

sum, difference, product:

x-values in the domain of BOTH $f(x)$ and $g(x)$

quotient

x-values in the domain of BOTH $f(x)$ and $g(x)$

DOES NOT INCLUDE x-values which make $g(x) = 0$.

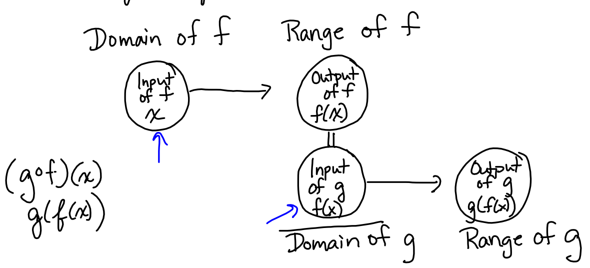
Composite Functions $\overset{g(f(x))}{g(3x)} = (3x)^2 - 2 = \boxed{9x^2 - 2}$

$(g \circ f)(x) = \underbrace{g(\underbrace{f(x)}_{1})}_{2}$ "g of f of x"

1. Evaluate $f(x)$.
2. Use $f(x)$, (the result) as the input for g.

Note $g(f(x))$ does not always equal $f(g(x))$

The output of the inside/first function becomes the input for the outside/second function.



Domain of a composite function

x-values in the $\boxed{\text{domain of}}$ BOTH $f(x)$ and $\boxed{g(x) \rightarrow f(x)}$ ← y values

x-values in the domain of f for which $f(x)$ is in the domain of g.

$f(x) = x + 1$ → $x + 1 \neq 0$ D: ARN

$g(x) = \frac{1}{x}$ D: $x \neq 0$

$f(x) \neq 0$

$x + 1 \neq 0$

$\boxed{x \neq -1}$

$\boxed{g(\overset{\neq 0}{f(x)})} = g(x+1) = \frac{1}{x+1}, \quad x \neq -1$

ARN

Restrictions on domain:

① No "0" in denominator

- Set den = 0 and solve.
- These values are <u>not</u> in domain.

② No negatives under even indexed radicals

$\sqrt[even]{\cancel{-}}$

- Set radicand ≥ 0 and solve.

Ex: $\sqrt{x+7}$ Domain:

$x+7 \geq 0$

$x \geq -7$

* Note:

Domain of functions:

- Absolute value ARN
  $y = a|x-h|+k$
- Linear ARN
  $y = mx+b$
- Quadratic ARN
  $y = ax^2+bx+c$
- Polynomials ARN
  $y = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_0$
- Cube roots ARN
  $y = a\sqrt[3]{x-h}+k$